

PHOTO E 2.2-1  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE



PHOTO E 2.2-2  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
VICINITY TOP OF STAIR #7

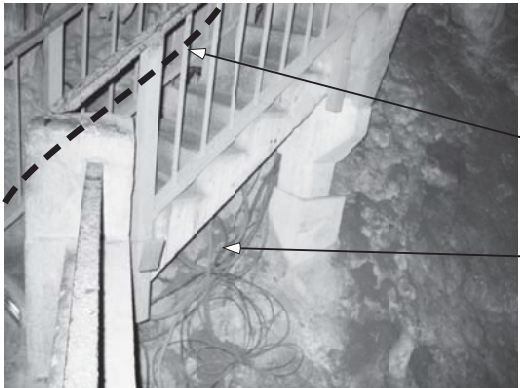


PHOTO E 2.2-3  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
BESIDE STAIR #6

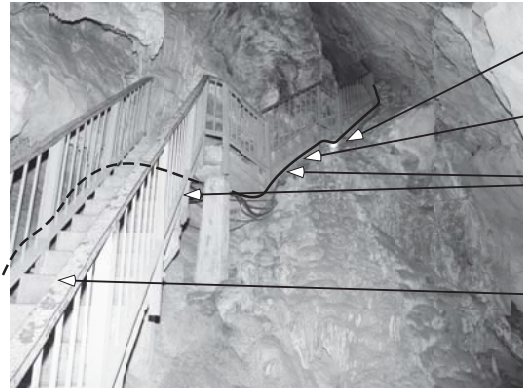


PHOTO E 2.2-4  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
CROSSING UNDER STAIR #6



PHOTO E 2.2-5  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
BESIDE STAIR #5

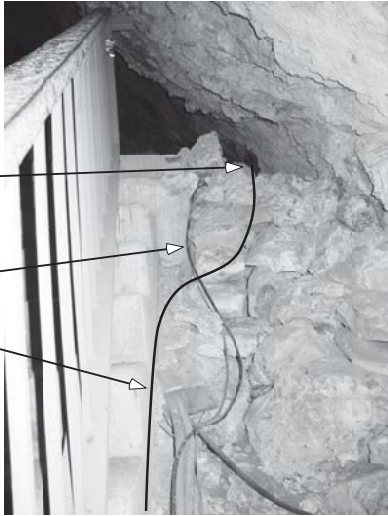


PHOTO E 2.2-6  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
NEAR TOP OF STAIR #5 LOOKING UP



PHOTO E 2.2-7  
POWER CABLE AND CORDS FOLLOW EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE ROUTE  
NEAR TOP OF STAIR #5 LOOKING DOWN



PHOTO E 2.2-8  
BRANCH CIRCUIT R4 ROUTE BELOW BEAVER SLIDE

EXTEND THIS EXISTING STAIR SLIGHTLY WITH CONCRETE TO PROVIDE A MEANS FOR BRANCH CIRCUITS R2, R3, R4, AND R5 TO CROSS THE TRAIL.

THESE BRANCH CIRCUITS SHALL BE INSTALLED IN SCHEDULE 40 SLEEVES WITH MORE THAN ONE BRANCH CIRCUIT PER SLEEVE.

CONCRETE TO MATCH EXISTING IN COLOR AND TEXTURE.

CONFER WITH CAVE SPECIALIST FOR ALTERNATIVE CROSSING LOCATIONS IN THIS AREA.

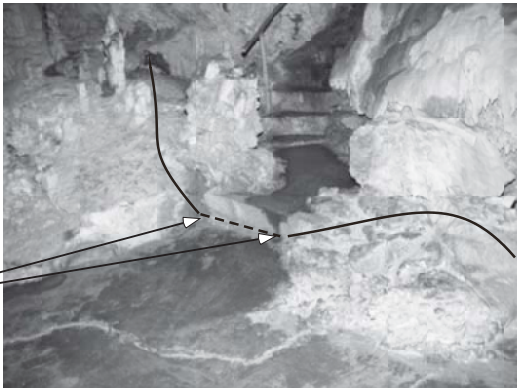


PHOTO E 2.2-9  
PATHWAY CROSSING FOR BRANCH CIRCUITS R2, 3, 4, & 5  
IN LOWER CATHEDRAL ROOM

BRANCH CIRCUIT R1 CONTINUES ON SIDE OF STAIR 06 TO SUPPLY NEW FIXTURES.  
SEE SHEET E-2.0.

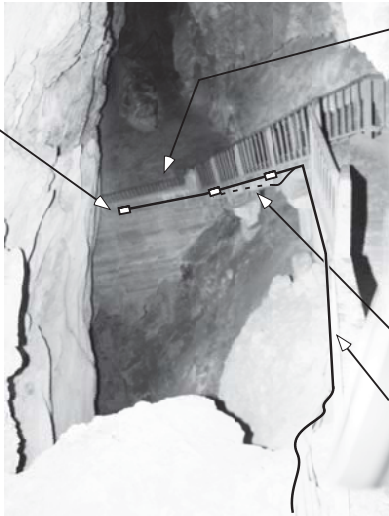
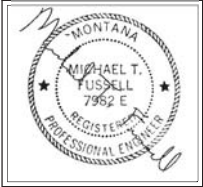


PHOTO E 2.2-10  
ROUTE FOR BRANCH CIRCUIT R1 TO FIXTURE 'B' AND  
FIXTURE 'C' AT BOTTOM OF STAIR #6



drawn	check by
MKE	MTF

issue log	
For bidding	03/23/18



Lewis & Clark Caverns State Park  
Railing and Lighting Upgrades 2018  
FWP #7176603  
Design & Construction  
P.O. Box 200701, 1522 Ninth Avenue  
Helena, MT 59620-0701  
*Montana Fish Wildlife & Parks*



LIGHT FIXTURE(S) THIS SHEET

FIXTURE 'B' IS AN EXISTING COMPOSITE BULLET WITH VARIOUS LED PAR LAMPS  
FIXTURE 'C' IS A NEW TUNABLE WHITE FIXTURE (SEE CATALOG SHEETS)  
FIXTURE 'F' IS A NEW WALL MOUNTED LED FIXTURE (SEE CATALOG SHEETS)

CONTINUATION OF EXISTING  
POWER FEEDER CABLE;  
EXISTING LEAKY FEEDER  
COMMUNICATIONS CABLE

SW1-CAB 4  
SW1-CAB 2

ROUTE BELOW  
FORMATION. LOOSE  
LAID ON FLOOR OF  
CAVERN.

THIS CROSSING CONTAINS THE FOLLOWING ITEMS:  
NEW MAIN POWER FEEDER(S), EXISTING  
LEAKY FEEDER COMMUNICATIONS CABLE,  
NEW BRANCH CIRCUIT R2  
NEW SWITCH LEADS SW1-CAB 3 AND SW1-CAB 4

SWITCH MOUNTING NOTES FOR THIS SHEET

1. MOUNT SWITCHES SW2-CAB 2 AND SW3-CAB 2 IN INDIVIDUAL BOXES,  
SURFACE MOUNTED ON THE CAVERN WALL AT 42" ABOVE TRAIL.

THIS CROSSING CONTAINS THE FOLLOWING  
ITEMS:  
BRANCH CIRCUITS R3 AND R4

PLAN VIEW

CABLES BESIDE STEPS. SECURE WITH CABLE CLAMPS  
TO WALL. (CLAMPS SHALL COMPLY WITH ALL  
REQUIREMENTS OF GENERAL PROJECT NOTE #6,  
SHEET G-2.0. TYPICAL ALL AREAS WHERE CLAMPS  
ARE USED.)

MAIN FEEDER CABLE(S) WITH GROUND, AND  
LIGHTING BRANCH CIRCUITS, FOLLOW ROUTE OF  
EXISTING LEAKY FEEDER CABLE, WHICH IS BURIED  
UNDER RUBBLE ON FLOOR AT SIDE OF TUNNEL.

REMOVE RUBBLE TO INSTALL NEW WORK, THEN  
REPLACE AND ARRANGE TO APPEAR AS NATURAL  
AS POSSIBLE.

SEPARATE MC CONDUCTORS NOT SHOWN AS IT IS  
CO-LOCATED THE LEAKY FEEDER CABLE.

INSTALL JUNCTION BOX  
AT EACH LIGHT FIXTURE  
AND SWITCH LOCATION,  
SEE DETAIL THIS SHEET

SEE SHEET E4.0 FOR  
CONTINUATION OF  
CORD AND CABLE  
ROUTING.

SW4-CAB 2  
R3-CAB 2  
R4-CAB 2 UPS  
CONTINUATION OF EXISTING  
POWER FEEDER CABLE;  
EXISTING LEAKY FEEDER  
COMMUNICATIONS CABLE  
DASHED LINE/ARROW INDICATES ROUTE BELOW FILL,  
THROUGH NATURAL OPENINGS IN CAVERN  
FORMATION, UP FROM SHEET E-4.0

THIS LIGHT FIXTURE  
SUPPLIED THROUGH  
RELAY R5 IN CABINET  
2 BUT TURNED ON BY  
SW1-CAB4

NEW CABINET #2,  
NEW PANEL 'C' &  
RELAY WITH  
INVERTER.

LOOSE LAID ON FILL AT WALL,  
TYPICAL THIS AREA.  
TURN DOWN ONTO TRAIL OFF OF RAISED  
FILL BED. BEGIN TEK CABLE AND CABLE  
CLAMPS AT INTERSECTION OF FLOOR AND  
STONE RETAINING WALL.

INSTALL SWITCHES SURFACE  
MOUNTED ON THE WALL USING  
APPROPRIATE HARDWARE AND  
CABLE

SW2-CAB 2  
SW3-CAB 2

END R1  
END R4  
END R5-  
CAB 2

END R1  
END R4  
END R5-  
CAB 2

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END R4  
END R5-  
CAB 2

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CAB 2

END R1  
END R4  
END R5-  
CAB 2

END R1  
END R4  
END R5-  
CAB 2

PROJECTED PROFILE

THE STAIRS SHOWN ARE THE ORIGINAL STAIRS AT THE TIME OF MAPPING

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SAFETY OFF AND DEMOLISH EXISTING CONDUIT AND LIGHT FIXTURE SUPPLY BACK TO JUNCTION BOX OR CUT OFF FLUSH WITH TRAIL SURFACE AFTER THE NEW RAILING HAS BEEN INSTALLED.

FOR LIGHT FIXTURES SUPPLIED FROM CORDS, SAFETY OFF THE CORD AT THE EXISTING JUNCTION BOX AND MARK THE END OF THE CORD WITH FLAGGING TAPE. THE OWNER WILL REMOVE THE LIGHT FIXTURE AND CORD. (TYPICAL OF ALL LOCATIONS)

ANOTHER EXAMPLE OF EXISTING LOOSE LAYED WIRING THAT SHALL BE DEMOLISHED BY THE CONTRACTOR.

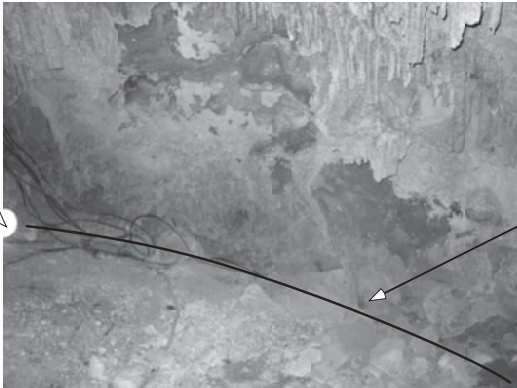


PHOTO E 3.1-1  
FEEDER CABLING ROUTING AROUND FILLED AREA

LOOSE LAY CABLE ON THE CAVE FLOOR, TIGHT AGAINST CAVERN WALL AS INDICATED; COVER WITH LOOSE STONE RUBBLE

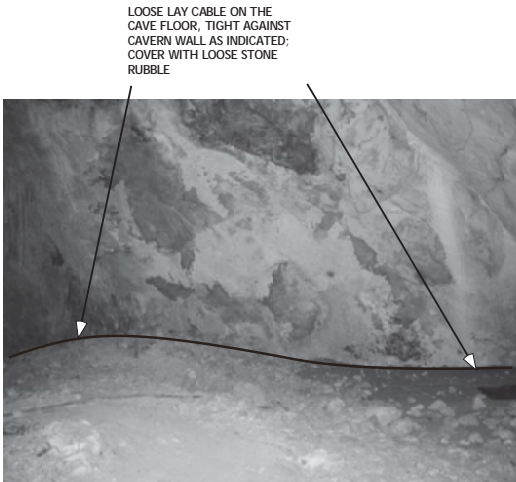


PHOTO E 3.1-2  
FEEDER CABLING ROUTING AROUND FILLED AREA

FURNISH AND INSTALL CABINET 2 WITH A UPS, LOAD CENTER 'C' AND RELAY PANEL AT THIS APPROXIMATE LOCATION.

THE CABINET SHOULD BE A FREE STANDING AND CAN BE SECURED TO THE LOWER CAVERN WALL WITH A STRAP.

CONFIRM LOCATION WITH CAVE SPECIALIST.

LOOSE LAY CABLE ON THE CAVE FLOOR, TIGHT AGAINST CAVERN WALL AS INDICATED; COVER WITH LOOSE STONE RUBBLE

TURN CABLE DOWN ONTO TRAIL OFF OF RAISED FILL BED. BEGIN CABLE AND CABLE CLAMPS AT INTERSECTION OF FLOOR AND STONE RETAINING WALL.

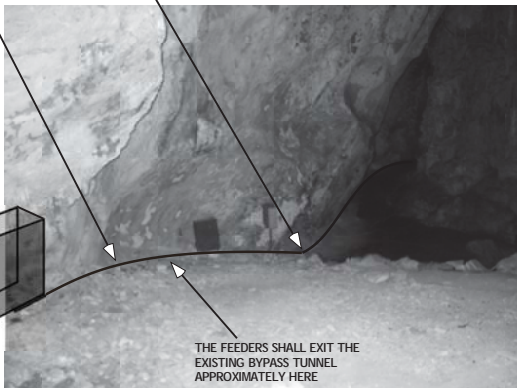


PHOTO E 3.1-3  
APPROXIMATE LOCATION OF CABINET 2

FOR ALL CABLE INSTALLED ALONG THE TRAIL, THE INTENT IS TO FOLLOW THE CONTOUR OF WALL AS ACCURATELY AS POSSIBLE SO AS TO AVOID TRIPPING HAZARD TO THE CAVE VISITORS.

NOTE THAT POWER FROM EXISTING RECEPTACLES IS AVAILABLE UNTIL DEMOLITION (THEN USE NEW RECEPTACLES); CAN BE RUN FROM THE NEAREST RECEPTACLE TO THE AREA OF WORK.

TURN CABLE DOWN ONTO TRAIL OFF OF RAISED FILL BED. BEGIN CABLE AND CABLE CLAMPS AT INTERSECTION OF FLOOR AND STONE RETAINING WALL.

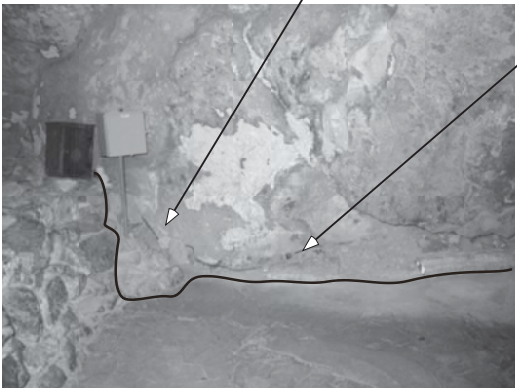


PHOTO E 3.1-4  
ROUTE OF CABLING INTO THE TUNNEL OFF OF THE RAISED RUBBLE AREA

ROUTE CABLE ALONG THE TRAIL, TIGHT TO WALL. SECURE WITH CABLE CLAMPS TO TUNNEL WALL AT CAVE WALL/ TRAIL INTERFACE

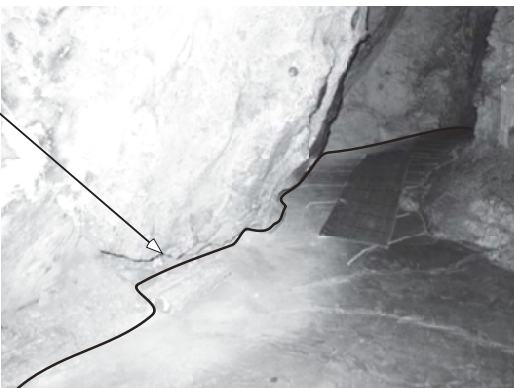


PHOTO E 3.1-5  
ROUTE OF CABLING INTO THE TUNNEL

ROUTE CABLE ALONG THE TRAIL, TIGHT TO WALL. SECURE WITH CABLE CLAMPS TO TUNNEL WALL AT CAVE WALL/ TRAIL INTERFACE.



PHOTO E 3.1-6  
ROUTE OF CABLING IN THE TUNNEL

ROUTE CABLE ALONG STAIR. SECURE WITH CABLE CLAMPS TO TUNNEL WALL TIGHT TO FLOOR/ STAIR TREAD.



PHOTO E 3.1-7  
ROUTE OF CABLING BESIDE STAIR #17

REMOVE THE LOOSE LAID ROCKS ALONG THE EXISTING TRAIL AND INSTALL CABLE ON THE CAVE/ TRAIL FLOOR AT THE TUNNEL WALL/ FLOOR INTERFACE.

REPLACE THE ROCKS CAREFULLY ON THE CABLING TO HIDE THEM.



PHOTO E 3.1-8  
ROUTE OF CABLING ABOVE STAIR #17

REMOVE THE LOOSE LAID ROCKS ALONG THE EXISTING TRAIL AND INSTALL CABLE ON THE CAVE/ TRAIL FLOOR AT THE TUNNEL WALL/ FLOOR INTERFACE. FOLLOW ROUTE OF EXISTING LEAKY FEEDER COMMUNICATIONS CABLE

REPLACE ROCKS CAREFULLY TO CONCEAL BOTH NEW AND EXISTING CABLES.



PHOTO E 3.1-9  
ROUTE OF CABLING ABOVE STAIR #17 AND TRAIL CROSSING

SAFETY OFF AND DEMOLISH EXISTING CONDUIT AND LIGHT FIXTURE SUPPLY BACK TO JUNCTION BOX OR CUT OFF FLUSH WITH TRAIL SURFACE AFTER NEW LIGHTING SYSTEM HAS BEEN INSTALLED.

USE EXISTING TRAIL CROSSING SLEEVE WITH LEAKY FEEDER COMMUNICATIONS CABLE

NEW, LIGHTED RAILING LOCATED BETWEEN STAIR #18 AND RAMP #18A

R3 LOOSE LAY DOWN STAIR 18 ON TRAIL LEFT SIDE (DIRECTION OF TRAVEL)

EXISTING RAILING WILL BE REPLACED WITH NEW, LIGHTED RAILING, STAIR #18 LEFT SIDE (DIRECTION OF TRAVEL); SAME RAILING, BOTH PHOTOS. VERIFY USING RAILING DRAWINGS.

R4 IN PVC SLEEVE IN SAW CUT TO RIGHT SIDE OF STAIR 18 (DIRECTION OF TRAVEL)

R4 OVER TOP OF RUBBLE WALL THEN FOLLOW FORMATION TO BEGINNING OF SAW CUT

CORNER OF RUBBLE WALL

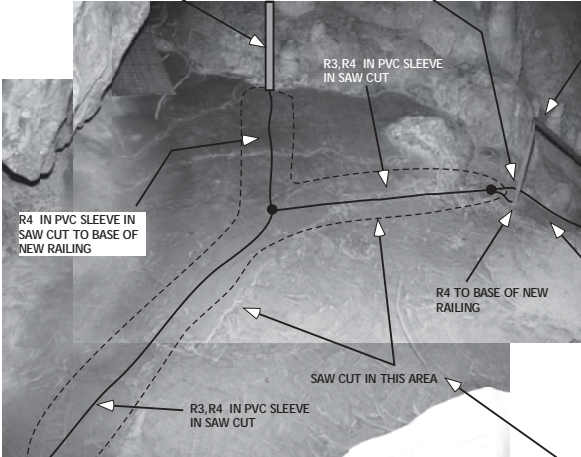


PHOTO E 3.1-10  
ROUTE OF CABLING ABOVE STAIR #18 AND TRAIL CROSSING

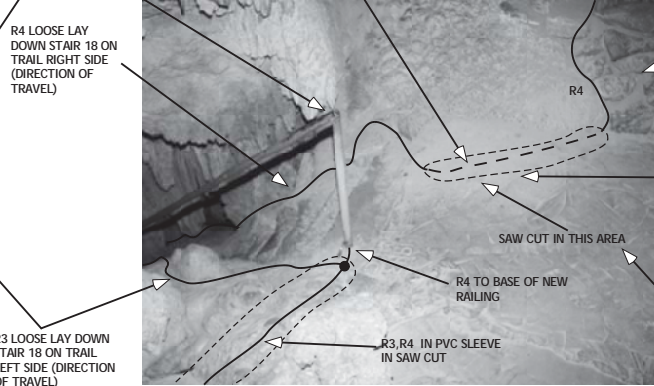
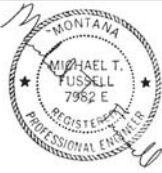


PHOTO E 3.1-11  
ROUTE OF CABLING ABOVE STAIR #18 AND TRAIL CROSSING

SEE SAW CUT NOTE #9, GENERAL PROJECT NOTES, SHEET G-2.0

Lewis & Clark Caverns State Park  
Rail and Lighting Upgrades 2018  
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E 3.1